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The Lobster Fisheries in the Republic of South Africa and Namibia, 1975-76

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Office of International Fisheries
Washington, D.C.
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THE LOBSTER FISHERIES IN THE REPUBLIC OF SOUTH AFRICA AND NAMIBIA, 1975-76

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ABSTRACT

Two species of rock lobster are harvested commercially off the Republic of South Africa and Namibia. Catches in 1975 were nearly 8,600 metric tons (t); most of the catch was sold as frozen tails. In 1975, exports, mainly to the United States, were over 2,500 t, valued at $27 million.

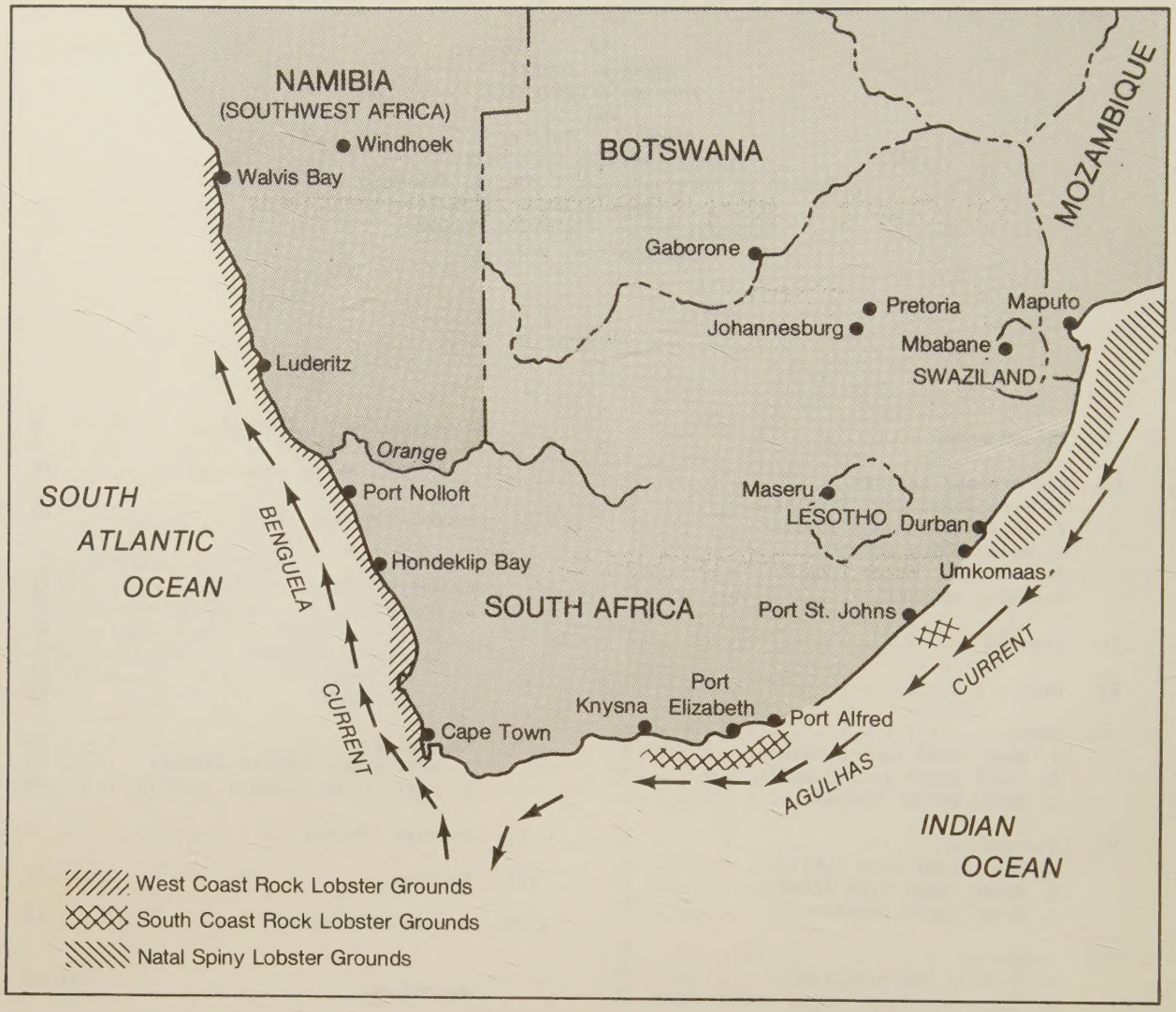


Figure 1.--Map of the South African and Namibian lobster grounds.

I. INTRODUCTION

The Republic of South Africa had the world's 14th largest fishing catch in 1975. With a combined Atlantic and Indian Ocean coastline of over 3,000 kilometers (km), its fishermen catch well over a million tons of fish each year. The most productive fishing grounds are along the western coast; over 95 percent of the catch is landed in or near Capetown. The major pelagic fisheries are pilchards and anchovies (which are canned and also processed into fish meal and oil), and Cape horse mackerel. The Republic's fishermen catch more pilchards than anyone else in the world, making South Africa an important fish meal producer. The trawl fisheries catch mainly Cape hake and sole. Lobster is a very important fishery in both the Republic and Namibia; in 1975, lobster landings were valued at $27 million. Of all South African fishery exports to the United States in 1975, lobster was 75 percent of the total value.

II. SPECIES AND GROUNDS[1/]

A. West Coast rock lobster

West Coast rock lobsters (Jasus lalandii) live off the western coast of southern Africa, from north of Walvis Bay in Namibia, south to Capetown in the Republic of South Africa (fig. 1). This species lives in rocky areas together with black mussels (Aulacomya ater), which are an important food source. The western coast of southern Africa has extensive kelp beds that provide food and shelter for lobsters.

The West Coast rock lobster is plentiful in water 9° to 16°C to a depth of 38 meters (m), but has occasionally been found at 128 m. Several species of fish feed on its larvae, especially albacore. The Cape fur seal, hagfish, octopus, and dogfish feed on adult lobsters.

Groups of West Coast rock lobsters tend to seek shelter in crevices and caves, especially during rough weather. Some larger males, however, stay isolated in crevices and bar entry to other lobsters. Larger lobsters resist predators by bracing themselves against the walls of the cave or crevice, but smaller lobsters dart around to avoid an attacker.

The West Coast species feeds primarily during the early morning and late afternoon. Commercial fishermen say that the best catches are made early in the morning before sunrise when the lobsters are actively feeding. Lobsters reportedly feed only during calm weather, and can survive for weeks without food.

The minimum legal size in the Republic is a carapace length of 8.9 centimeters (cm), which lobsters reach in about 6 years. Some adults reach carapace lengths of 17 cm. They spawn only once a year; females bear eggs from June to September. The males molt in the spring and early summer (October to December), the females in May and June.

B. South Coast rock lobster

South Coast rock lobsters (Palinurus gilchristi) live off the southern coast of the Republic of South Africa at depths of 110 to 150 m on the edge of the continental shelf. The grounds extend from 75 km off Knysna to 48 km off Port Alfred (fig. 1). The South Coast lobster may grow at a slower rate than lobsters found in warmer waters because the waters are cold (8° to 11°C) and food is scarce. The carapace length increases only by an average of 0.1 cm per molt. Mature adults have a maximum carapace size of about 12 cm. The frequency of molting has not yet been determined, but it may be only once a year. South Coast rock lobsters live in flat rocky areas; they brace themselves against the rocks when attacked.

Immature lobsters, with carapace lengths less than 6 cm, are not often found on the fishing grounds. This may indicate that they migrate from other areas, or do not enter the traps owing to some behavioral characteristic, or that recruitment is so low that the population is being depleted before the juveniles can mature.

C. Natal spiny lobster

Natal spiny lobsters (Palinurus delagoae) are found off the eastern coast of the Republic of South Africa and Mozambique from Umkomaas in the province of Natal to Moma, Mozambique. They live on extensive, open, sandy areas where there are no rocks or crevices, in waters of 12° to 14°C, and at depths of 260 to 300 m. These lobsters are active walkers and migrate in tightly packed groups for protection. Because of this tendency to congregate, extremely large catches, reportedly during migrations, have been taken by single trawlers while other vessels fishing nearby have caught nothing. These catches, at the edge of the Agulhas Current (fig. 1), are composed primarily of egg-bearing females. This suggests that females may move to the edge of the Agulhas Current before hatching their larvae. The reason for this migration is not known.

D. Transkei spiny lobster

Transkei spiny lobsters (Panulirus homarus) live off the eastern coast of the Republic of South Africa and Mozambique, but are most abundant off the Natal coast (fig. 1). They inhabit the surf zones of reefs, clinging to rocks during rough weather. This species is usually found at depths of 1 to 5 m together with the brown mussel (Perna perna), its primary food source.

1/ Data on South African lobster species are summarized in appendix A.

The Transkei spiny lobster is a nocturnal species; during the day, it stays in the cracks and crevices of the reefs. It defends itself by directing its spiny antennae toward the attacker; it backs up and braces itself against the roof of the crevice with its legs. During an attack, it emits a loud sound that warns other lobsters in the area to withdraw into their shelters. However, when attacked by an octopus, its greatest natural enemy, the lobster leaves its shelter and attempts to flee.

The moray eel, which preys on octopus, is often found living with the Transkei spiny lobster. Some divers, attempting to capture lobsters, have been attacked by eels. The eels apparently are attracted by the sound emitted by lobsters when they are attacked, which may indicate that an octopus is present.

E. Other species

A population of Tristan spiny lobster (Jasus tristani) was discovered on the Vema Seamount, in the southeastern Atlantic, 800 km off the coast of the Republic of South Africa (fig. 2) by a U.S. research vessel in 1964. The

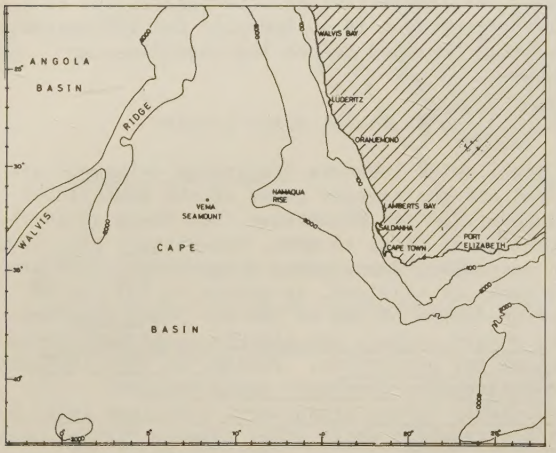


Figure 2.--Vema Seamount.

subsequent overfishing and mismanagement of the species exhausted the stocks; fishing became unprofitable by 1966.

Other species found off the southern coast of Africa include Panulirus longipes, P. ornatus, P. penicillatus, P. versicolor, and Palinurus vulgaris.

Panulirus ornatus lives from Natal to the Red Sea, and is most abundant off the East African coast. This species seems to prefer turbid waters, and is found in shallow depths of 1 to 8 m.

P. longipes prefers deep, inaccessible caves and clear water. Its eyes are adapted for living in the deeper water and in caves where light is very dim. This species lives off the coasts of Zululand and Natal, but is not currently fished commercially.

P. penicillatus lives from the Red Sea to the Galapagos Islands off South America; a few have been found near Island Rock off the Zululand coast. They prefer to live in caves at depths of 1 to 4 m.

P. versicolor is the rarest of all these species and is not commonly found off southern Africa. A few juveniles have been found in Durban Harbor, but the environment in southern Africa is apparently not suitable to adult lobsters of this species.

Palinurus vulgaris lives off Durban in the Republic of South Africa and Maputo (formerly Lourenço Marques) in Mozambique.2/

III. VESSELS

The South African and Namibian lobster industries use modern vessels, and those fishing the South Coast grounds are equipped for processing and freezing the catch as soon as it is taken aboard. In the Republic of South Africa, 345 vessels and 3,553 dinghies were licensed to catch West Coast rock lobsters for the 1976 season. The vessels average 10 m long, have a

Figure 3.--West Coast rock lobster vessel. (c) Albert J. Stella, South African Rock Lobster Service Corporation.

2/ A detailed description of this species and its grounds can be obtained by writing the Language Services Branch (F412), NMFS, NOAA, Dept. of Commerce, Washington, D.C. 20235, requesting "Spiny Lobster Fishing Grounds off Southeast Coast of Africa," Bulletin of Tokai Regional Fisheries Research Laboratory, No. 65. February 1971, by Takeo Koyama.

five- to six-man crew, and carry one or two dinghies 3 to 4 m long, few of which are motorized. In Namibia, 36 similar vessels are licensed to catch lobsters, but only 21 vessels were active in 1976.

The South Coast rock lobster is currently harvested by 36 trawlers, 30 to 60 m long, with crews of about 15. Most of these vessels are factory trawlers capable of processing and freezing the catch at sea (fig. 4). Since the South Coast fishery began in 1974, several trawlers have been refitted for catching and

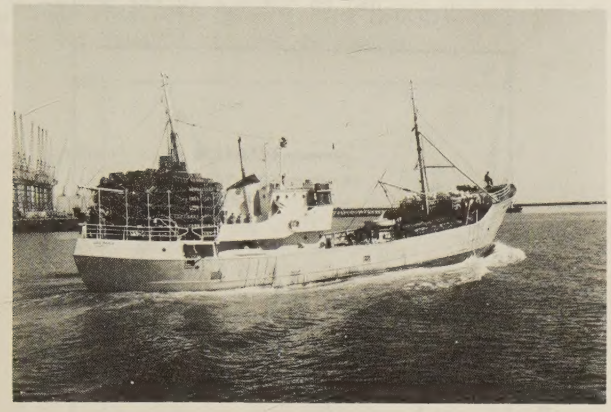


Figure 4.--South Coast rock lobster vessel. (c) Michael Stuttaford.

processing the South Coast lobster. Industry spokesmen have suggested that only vessels equipped with freezers should be allowed on the South Coast grounds. This would ensure high quality and prevent overfishing by limiting the number of vessels in the fishery. Several companies involved in the fishery selected vessels that could be easily reconverted to another use if the lobster fishery became unprofitable. A recent trend has been to equip vessels for two different types of fishing, so that during the closed lobster season the vessels can catch and process various species of fish.

IV. GEAR

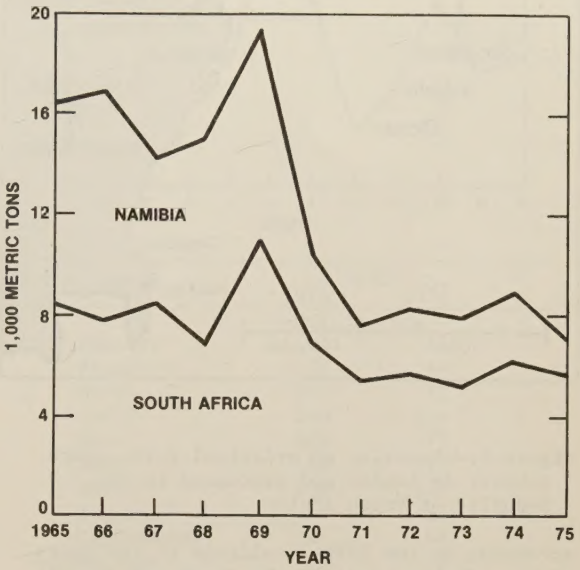
Lobsters are caught along the west and south coasts primarily by traps baited with fish heads or bullock hocks. The West Coast species is caught with large iron traps or hoop nets. The most commonly used trap on the South Coast grounds is the gray, plastic, rectangular "Kavel" type, previously imported from France. These traps are now manufactured under license in the Republic of South Africa by Elvinco Plastics, Capetown. The traps are 68 cm long, 58 cm wide, and 46 cm deep. The inlet neck is 22 cm across at its widest point.

The lobster vessels have grid sorters to enable undersized lobsters to fall back into the sea unharmed. The sorters consist of steel bars mounted 5 cm apart on the deck near the gunwale. The traps are unloaded onto the grid, and undersized lobsters slide down a chute running from the grid through a hole cut in the gunwale rails into the sea. This safeguards juvenile lobsters by returning them to the sea quickly, and expedites processing by reducing hand sorting.

V. CATCH

A. West Coast rock lobster

In 1975, lobster landings were 7,400 t in South Africa and Namibia combined. Catches in 1975 were more than 60 percent less than those in the record year of 1969. The catch declined sharply between 1969 and 1971, but has since stabilized at between 7,400 t and 9,000 t. Although catches have declined in both South Africa and Namibia, the decline has been more severe in Namibia (fig. 5).



Year	Quantity		
	South Africa	Namibia	Total
	--1,000 Metric tons--		
1965	8.4	8.0	16.4
1966	7.9	8.9	16.8
1967	8.3	5.9	14.2
1968	6.7	8.5	15.2
1969	11.2	8.5	19.7
1970	6.8	3.5	10.3
1971	5.6	2.2	7.8
1972	5.8	2.4	8.2
1973	5.2	2.8	8.0
1974	6.1	2.9	9.0
1975	5.8	1.6	7.4

Source: FAO. Yearbook of Fishery Statistics, various years.

Figure 5.--South African and Namibian catch of West Coast rock lobster, 1965-75.

Lobster catches vary considerably from one ground to another. In 1973, for example, the catch per unit effort in the Republic was highest on the southern grounds near Capetown, but in 1974 the trend was reversed; the best catches were made off Lamberts Bay, Elands Bay, and Hondeklip Bay in the north (fig. 6).

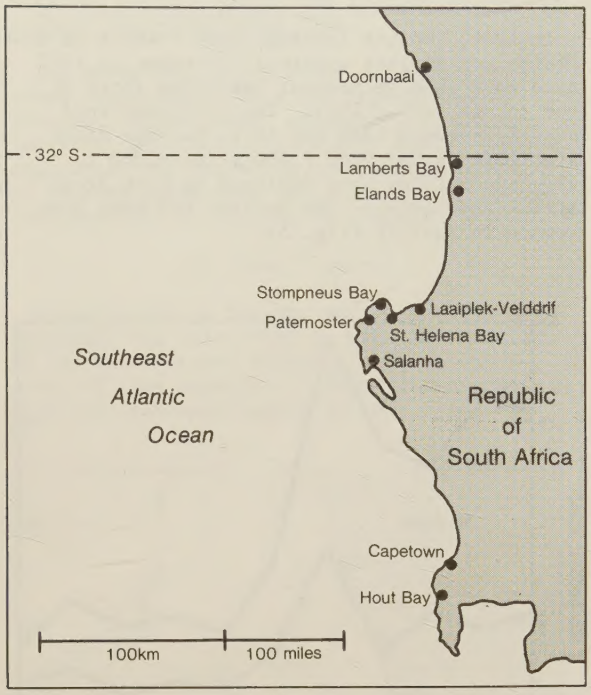
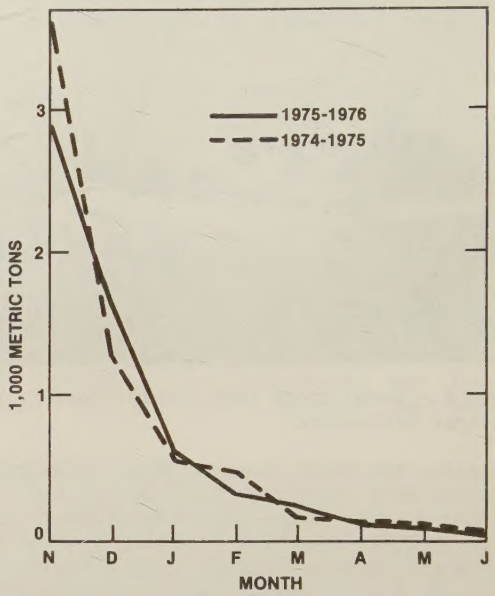


Figure 6.--Location of principal ports where lobster is landed and processed in the Republic of South Africa.

According to the 1970-71 edition of the South African Fishing Industry Handbook and Buyer's Guide, these variations were caused by "severe overexploitation of this vulnerable resource--and not just ... bad weather conditions which have frequently been blamed." Lobsters are very susceptible to overfishing because they grow slowly. The weather does also cause catch variations. Because the West Coast rock lobster does not feed during rough weather, it is less likely to enter baited traps. Catches may thus decline during extended periods of bad weather. The primary cause of the catch variations, however, is probably overfishing.

Rock lobster fishing off the Republic and Namibia is regulated by Government quotas. The 1975-76 quota for the West Coast rock lobster was about 6,259 t for the Republic and 4,490 t for Namibia.3/ In the Republic, most of this quota was filled in the first 3 months of the season, and almost 50 percent was caught in November when the season opened. After February, the fishing effort declined; when the season ended in June 1976, catches had fallen to 18 t (fig. 7). Although fishermen in the south easily filled their quota, fishermen from the northern ports of Port Nolloth and Hondeklip Bay suffered a poor season and had to operate in the south.



Month	1975-76	1974-75
November	2,863	3,598
December	1,697	1,209
January	680	624
February	324	400
March	202	86
April	59	66
May	43	25
June	18	26
Total	5,886	6,034

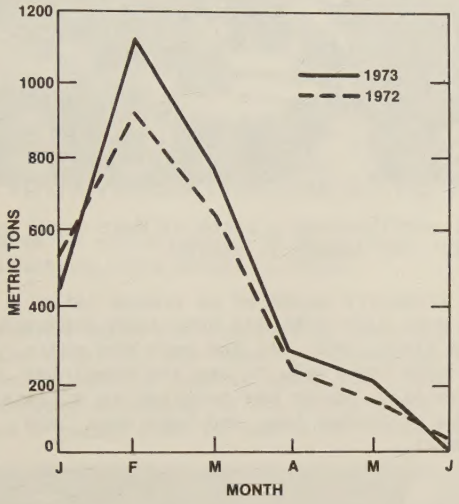
Source: Sea Fisheries Branch, Department of Industries, Capetown.

Figure 7.--Monthly catch of West Coast rock lobster in the Republic of South Africa, 1975-76 seasons, in metric tons (live weight).

3/ Tail weight statistics for the West Coast lobster have been converted to live weight at the ratio of 3.3 to 1 to enable the reader to compare catch, quota, maximum sustainable yield (MSY), and other statistics. This is the official conversion rate of the Branch of Sea Fisheries for the West Coast species.

The 1975-76 season at Luderitz in Namibia was termed "disastrous" by the South African Fishing Industry Handbook and Buyers Guide, 1976-77. Only one third of the quota of 4,490 t (live weight) was filled, largely owing to poor weather conditions and overfishing in previous years.

In addition, South African authorities report that catch declines in Namibia have recently been caused by industrial pollution. High sulfide and low oxygen levels have been detected on some Namibian lobster grounds. Available 1972 and 1973 monthly catch data for Namibia show that the peak of the season was February, and catches declined near the end of the season in June (fig. 8). More recent monthly catch data for Namibia are not available.



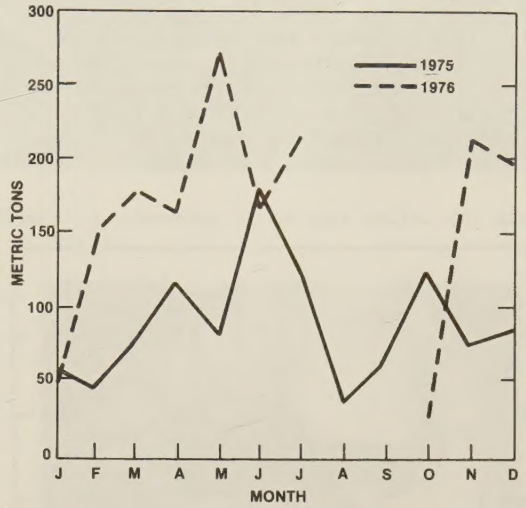
Month	Year 1973	1972
	--Metric tons 1/--	
January	426	544
February	1,141	918
March	793	650
April	254	210
May	190	134
June	22	29
Total	2,826	2,396 2/

1/ Live weight. 2/ Total as reported by Sea Fisheries Branch; column actually adds to 2,485 t.
Source: Sea Fisheries Branch, Department of Industries, Capetown.

Figure 8.--Monthly catch of West Coast rock lobster in Namibia, 1972 and 1973.

B. South Coast rock lobster

South Coast rock lobsters have been fished commercially only since 1974. The catch has increased from over 825 t (live weight) in 1974 to nearly 1,600 t in 1976. The Government is concerned about overfishing of the South Coast stocks. Regulations were adopted in 1975.4/ Research is being done to determine the maximum sustainable yield (MSY) of the resource; the preliminary MSY is 630 t (live weight)5/, pending further study. Commercial catches have thus significantly exceeded the estimated MSY during recent years. Catches of South Coast lobster vary throughout the year. The 1975 peak monthly catch of nearly 180 t was caught in June. In 1976, the largest quantity was caught in May (fig. 9).



Month	Year 1976	1975
	--Metric tons 1/--	
January	47	55
February	153	47
March	180	72
April	160	114
May	268	77
June	158	179
July	208	117
August 2/	--	36
September 2/	--	64
October	23	119
November	204	76
December	192	78
Total 3/	1,594	1,033

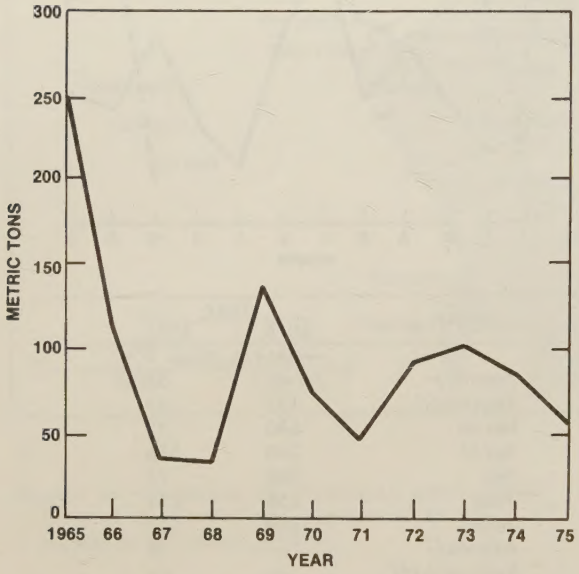
1/ Live weight. 2/ In 1976, the harvesting season was closed from July 31 to September 30.
3/ Totals may not agree owing to rounding.
Source: Sea Fisheries Branch, Department of Industries, Capetown.

Figure 9.--Monthly catch of South Coast rock lobster in the Republic of South Africa, 1975 and 1976.

4/ These regulations are described in section IX.
5/ Unlike the West Coast lobster, the tail of the South Coast lobster makes up nearly half of its total body weight. Therefore, the Branch of Sea Fisheries suggests that tail weight statistics for the South Coast lobster be converted to live weight at the ratio 2.13 to 1.

C. Natal spiny lobster

Natal spiny lobsters are landed as incidental catches of trawlers that fish primarily for shrimp, prawns, and langoustines. The small numbers of lobsters caught are sold on the wharves when landed; none are exported. However, catch statistics have been kept since 1965. The largest catch of over 250 t was recorded in 1965. Since then, the catch has declined 80 percent to only 53 t in 1975 (fig. 10). The number of trawlers operating off Natal (fig. 1) doubled between 1972 and 1974; the declining catches since 1973 may indicate that stocks of Natal spiny lobster are being depleted by the expanded fishing effort. No monthly catch data are available for this species.



Year	Quantity
	Metric tons[1/]
1965	252
1966	117
1967	32
1968	31
1969	142
1970	74
1971	44
1972	93
1973	105
1974	86
1975	53
1976	NA

1/ Live weight.
Source: South African Fishing Industry Handbook, and Buyer's Guide 1976-77.

Figure 10.--Natal spiny lobster catch, 1965-75.

VI. PROCESSING

A. West Coast rock lobster

The catches of West Coast rock lobster are processed in shore-based plants in the Republic of South Africa and in Namibia. The lobster

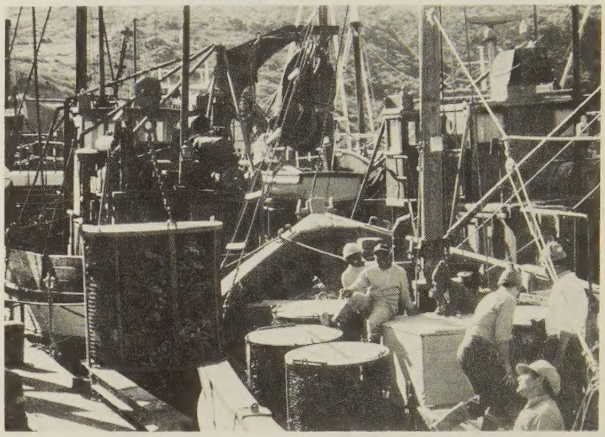


Figure 11.--Offloading a catch of West Coast rock lobster. (c) Albert J. Stella.

catch is primarily marketed as frozen tails, although some live lobsters have been exported to Europe since 1962. In the past few years, attempts have been made to use the remaining legs and bodies, which has resulted in a limited production of frozen leg and body meat and lobster meal.

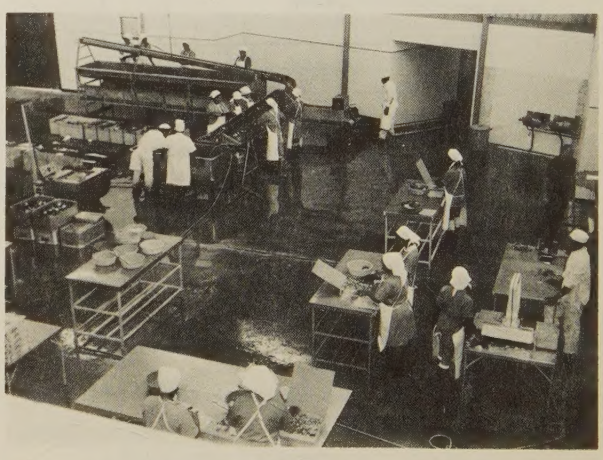


Figure 12.--West Coast rock lobster processing plant (interior). (c) Albert J. Stella.

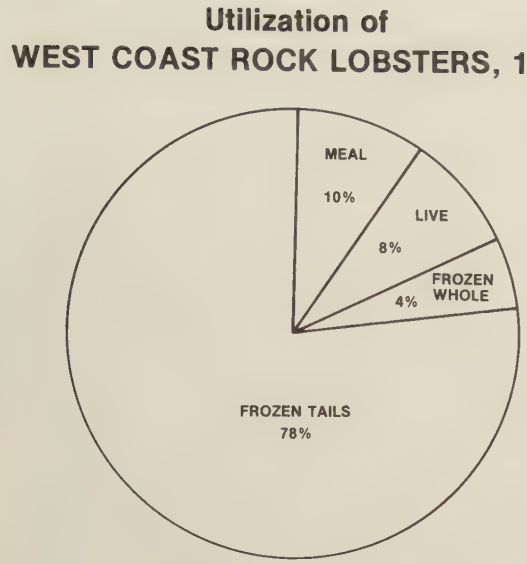


Figure 13.--Utilization of West Coast rock lobsters (live weight), 1975.

Frozen tails are produced by removing the tails (fig. 14) and then the alimentary canal.6/ This is usually done by hand, but a new technique developed in the South Coast fishery uses a vacuum pump to remove the alimentary canal.

Figure 14.--Removal of the tail. (c) Albert J. Stella.

After the tails are "de-wormed," they are washed (fig. 15), graded, and wrapped in individual plastic bags (fig. 16). They are then placed in cartons, frozen, and shipped.

6/ Popularly called "de-worming."

Figure 15.--Washing of lobster tails. (c) Albert J. Stella.

Figure 16.--Tails are wrapped in individual plastic bags and placed in 10-lb (4.54 kg) cartons. (c) Albert J. Stella.

Lobsters to be shipped live are held in tanks with continuously circulating fresh seawater for at least 10 days, although it is possible to hold them up to 5 months. The lobsters are kept at least 10 days to purge their intestinal tracts and to let them recover from the shock of being caught and handled. They are then packed in 10-kg cartons with wood shavings. A plastic bottle of frozen seawater is placed in the carton to maintain a low temperature during the flight to Europe. Once they arrive, they are held live

in tanks filled with circulating seawater until sold. These techniques have reduced the mortality rate and shipment losses to less than 3 percent.

The canning of lobster tails, once the mainstay of the industry, is still done on a very small scale in Luderitz, Namibia. Production decreased from 64 t in 1969 to only 8 t in 1972, and is now listed as "negligible" in Government statistics.

In the Republic of South Africa, several companies, including subsidiaries of United Oceana, now produce boiled and shelled leg meat for domestic consumption. Chapman's Peak Fisheries of Hout Bay, for example, markets "Craynips" in gift packages.

The industry has also investigated other ways of using the body and legs that remain after the tail is removed. The body and legs account for about two-thirds of the weight of the lobster. Unsuccessful attempts were made in the 1960's to use the carapaces for bisque, and the legs for soups, spreads, and other preparations. Currently, some of the unused parts of the lobster are reduced to meal for poultry and livestock feed.

Table 1.--Output of West Coast rock lobster products, 1972-75

	Year			
	1975	1974	1973	1972
	Metric tons 1/			
Live	291	283	230	197
Frozen				
Whole	152	132	71	52
Tails	2,760	2,817	2,328	2,327
Canned	-	-	negl.	8
Meal	353	480	438	471
Total	3,556	3,712	3,067	3,055

1/ Product weight.
Source: U.S. Consulate General, Capetown.

B. South Coast rock lobster

The South Coast rock lobster catch is processed entirely at sea; only frozen tails are landed. The tails are removed as soon as the traps are hauled aboard. The remaining bodies are fed through a pulverizing mill and dumped overboard after the vessel has left the lobster grounds.7/

7/ It was found that the presence of large quantities of unmilled lobster offal tended to drive the lobsters away from the grounds. In addition, the decomposition of offal depletes the water of oxygen needed by the lobsters.

The tails are placed in plastic baskets and washed in large tanks. They are then removed from the tanks and "de-wormed." As in the land-based plants, this is usually done by hand, although some of the newer vessels are equipped with vacuum pumps. The pump has two air lines that end in steel nozzles; these are placed against the tail to draw out the alimentary canal. After the tails are "de-wormed," they are washed again and placed in a tank containing sodium meta-bisulphite solution to prevent their discoloration. Next, the tails are placed on a trough for grading and packing, and are then weighed and frozen.

When the fishery began in 1974, the discoloration of the membrane under the tail shell was unacceptable to American consumers. Studies made by the Fishing Industry Research Institute and by the South African Bureau of Standards showed that because the shell of the South Coast species is especially thin and susceptible to bruising, careful handling and rapid processing are essential. The tails must be frozen quickly in small blocks, and handled as little as possible. At first, the South African Department of Health did not permit the use of sodium meta-bisulphite solution on lobster tails, although it was widely used for shrimp treatment. Recently, however, the Department has authorized its use on lobster tails because it has proven much more effective than ascorbic acid which was previously used. The United States does not prohibit use of the chemical in reasonable quantities if its application is declared by South African exporters.

C. Natal spiny lobster

The Natal spiny lobster catch is landed whole and sold live in fishing ports. It is not processed.

VII. COMPANIES

A. History and background

1. West Coast rock lobster

The West Coast rock lobster industry began in the second half of the 19th century. The first tails were canned in the 1870's, and until 1930, processing was done by small canneries, exporting primarily to France. The first frozen lobster tails were exported to the United States in the mid-1930's, but World War II disrupted these shipments. After the war, lobster exports to the United States were resumed. Many of the small companies merged into larger groups. A strict quality control program was introduced, and an intensive marketing campaign was launched.

Frozen West Coast tails from South Africa are now well established on the American market; shipments are limited only by conservation measures taken by the Governments of the Republic of South Africa and Namibia to prevent overfishing. Processing plants near productive rock lobster grounds are located at Port Nolloth,

Hondeklip Bay, Doornbaai, Lambert's Bay, St. Helena Bay, Saldanha Bay, Capetown, and Hout Bay (fig. 6). In Namibia, the lobster processing industry is concentrated at Luderitz.

2. South Coast rock lobster

The South Coast rock lobster industry began in March 1974 with the discovery of large quantities of lobster by the fishing vessel St. Jean Baptiste, owned by the Kuttelfish Company. The existence of this resource had been suspected for many years because rock lobsters had been appearing in trawl nets after they were hauled. It was the large catches made by St. Jean Baptiste, however, that caused the South Coast boom.

B. The Fisheries Development Corporation (FDC)

In October 1944, the South African Government established the Fisheries Development Corporation to help develop the fishing industry.8/ FDC participates in buying, selling, processing, and marketing of fish and fish products. In addition, FDC is involved in housing, health, and other services offered to fishing communities. Although it was established by the Government, FDC buys shares in private fishing companies. Its structure is similar to that of a corporation, with stockholders and a board of directors.

However, FDC tries to limit its participation in individual companies, although it has invested in several fishing projects to promote the fishing industry. With a few exceptions, it has not acquired control of the companies in which it has invested. FDC activities include loans to fishermen, financing and managing social services in fishing communities, financial assistance for the construction of slipways and mooring facilities, vessel loans, and limited research designed to promote greater use of the Republic's resources.

FDC has supported the lobster industry on several occasions. During the extremely poor fishing season at Port Nolloth in 1970, it supported the local industry to prevent its total collapse. Another example of FDC support was in 1976 when it took control of the International Fishing Corporation (IFCOR) of Durban. IFCOR had withdrawn its vessels from the shrimp fishery off Mozambique because of the political situation there, and was in the process of refitting them for use on the South Coast rock lobster grounds. Its creditors were unwilling to advance funds without adequate security. FDC helped with the necessary financing, although it is not FDC policy to hold a controlling interest in any company.

8/ The Fishing Industry Development Act of 1950 authorized FDC to pursue its objectives in Namibia.

C. Companies in the Republic of South Africa

1. West Coast rock lobster processing companies

The West Coast rock lobster processing industry is dominated by the subsidiaries of large holding companies, although smaller independent quota holders also process some West Coast lobster. The United Oceana group holds the largest rock lobster interest; its six rock lobster processing subsidiaries held a quota of over 670 t of tails in 1976. The Fernandes group held the next largest lobster quota with nearly 185 t of tails. The largest independent processors are Stephan Rock Lobster Packers (112 t) and Chapman's Peak Fisheries (83 t). Appendices B and C provide additional information on companies processing the West Coast rock lobster.

2. South Coast lobster companies

The South Coast lobster fishery was initiated by the Kuttelfish Company; it still operates the largest fleet in the fishery. Other companies active in this fishery include the Gaston Fernandes group, Chapman's Peak Fisheries, IFCOR, Hout Bay Fishing Industries, Sentinal Fishing, and Blue Continent Fishing (a subsidiary of the United Oceana group). Since the Government closed the lobster fishery to foreign-flag vessels in 1975, several South African companies have acquired vessels previously operated under foreign flags. Appendices B and D provide additional information on companies active in the South Coast fishery.

D. Companies in Namibia

1. Introduction

Eight South African companies or their subsidiaries control almost all commercial fishing in Namibia. Of the capital invested in 1970, over 85 percent came from the Republic of South Africa and 15 percent from other foreign countries.9/ These eight companies are large conglomerates with diversified holdings in real estate, hotels, leasing, cattle ranching, mining, vegetable processing, and frozen food distribution. Many of these companies also have investments in other sectors of the fishing industry.

The South African Government has made nominal attempts to increase Namibian ownership of firms operating in Namibia. The complexity of the corporate structure coupled with the overlapping boards of directors of many companies, however, have made it very difficult for the Government

9/ United Nations. Report of the United Nations Council for Namibia, General Assembly Official Records: Twenty-Fifth Session, Supplement No. 24 (A/8024), New York, 1970, p. 39.

to carry out this policy. For example, in 1971, a United Party[10] spokesman in South Africa showed that although the Angra Pequena Company was granted a fishing license providing that 45 percent of the shares be sold to Namibian residents, South Africans who were only nominally resident in Namibia gained effective control of the company.

Lobster processing in Namibia is centered at Luderitz, although most of the other fish processing plants are located at Walvis Bay.[11] The companies at Luderitz have been seriously affected by recent declines in rock lobster catches. As a result, the three rock lobster quota holders in Luderitz (Angra Pequena, Sea Products, S.W.A., and SWAFIL) agreed in 1973 to process their catch in one factory. Each quota holder operated its own fleet as in the past, and production was divided according to landed weight. Costs were allocated proportionately. This arrangement has proven successful and has resulted in substantial savings for the three companies. Appendices B and E summarize information on the companies in Namibia.

2. Individual companies

a. Angra Pequena

The Angra Pequena Company operated a fleet of about 7 vessels out of Luderitz in 1976. Angra Pequena and another company in the Republic, Suid-Oranje, became wholly-owned subsidiaries of the Kaap-Kunene group in 1973. These companies were acquired by Kaap-Kunene for two reasons. First, this action enables lower profits caused by bad weather or poor catches in one plant to by spread thorughout the group. Second, it enables the Kaap-Kunene group to avoid a duplication of efforts, especially in the collection of trash fish and offal for reduction. South African fishermen dump an estimated 250,000 t of offal into the ocean off southern Africa each year. The merger will enable rock lobster vessels to transport the offal to a shore-based factory for processing into fish meal, during the closed lobster season. This avoids the otherwise substantial capital outlays required for special offal transport vessels, and enables the company to use their lobster vessels after they have filled their quota.

Angra Pequena also operates a plant at Luderitz that grinds lobster bodies and legs into meal; the company also has facilities for extracting leg and body meat. It is now studying the possibility of moving the meat extraction facilities from Luderitz to St. Helena in the Republic during peak catch periods in each area. The peak periods are November and December in the Republic of South Africa, and January to May in Namibia. Poor catches of rock lobsters by Angra Pequena caused the decline in after-tax profits of the Kaap-Kunene group in 1975. Profits dropped from $8.5 million in 1974 to $8.2 million in 1975, despite a tax reduction of over $2 million.

b. Sea Products, S.W.A.

Sea Products, S.W.A. (Seaswa), a holding company, belongs to the United Oceana group and owns several subsidiaries based at Luderitz and Walvis Bay. Seaswa's subsidiaries participating in the rock lobster industry are African Canning Co., Luderitz Bay Cannery, and Lurie's Canning Factory of Luderitz. These three companies primarily produce frozen lobster tails. Rock lobster fishing was only about six percent of the after-tax profit of the Seaswa group in 1975. Similar to many other companies participating in the West Coast lobster fishery, Seaswa's 1975 profits were adversely affected by declining catches off Luderitz.

c. South West African Fishing Industries, Ltd.

South West African Fishing Industries Ltd. (SWAFIL) is a holding and finance company that participates in the West Coast lobster fishery through its subsidiary, the Cape Lobster Canning Co. in Luderitz. The company also owns and operates a number of other seafood companies, but they do not participate in the lobster fishery.[12] The Cape Lobster Canning Co. accounted for 5 percent of SWAFIL's 1975 earnings.

VIII. DOMESTIC MARKET

Domestic consumption of lobster products, especially tails, is decreasing (table 2) as prices rise and catches decline. In 1972, the domestic consumption of tails was 265 t; by 1975, it had fallen to 119 t, or only 4 percent of the total tail production of about 2,800 t (table 1). Frozen leg and body meat is replacing frozen tails to some degree on the domestic market. Several companies, including subisdiaries of the United Oceana group, now produce shelled and boiled leg meat for domestic consumption. An independent company, Chapman's Peak Fisheries, markets this product as "Craynips" in gift packages. Most of South Africa's production of rock lobster meal is marketed domestically as poultry and livestock feed.

10/ The official opposition party in the Republic.

11/ Walvis Bay is considered by the Government of the Republic of South Africa to be an integral part of the Republic, although it is administered as part of Namibia.

12/ SWAFIL entered a joint venture with a Spanish company in 1971. It is called Gaditana Fishing Co.; 60 percent is owned by a SWAFIL subisdiary, West Coast Fishing Industries, and 40 per cent by Pesquerias Gaditana de Gran Altura of Madrid.

Table 2.--Domestic consumption of lobster products in the Republic of South Africa and Namibia, 1972-75

Commodity	1975	1974	1973	1972
		-- Metric tons--		
Tails				
Frozen	119	175	218	265
Canned	--	--	--	negl.
Lobster meal	249	17	77	59
Total	368	192	295	324

1/ Product weight.
Source: U.S. Consulate General, Capetown.

IX. EXPORTS

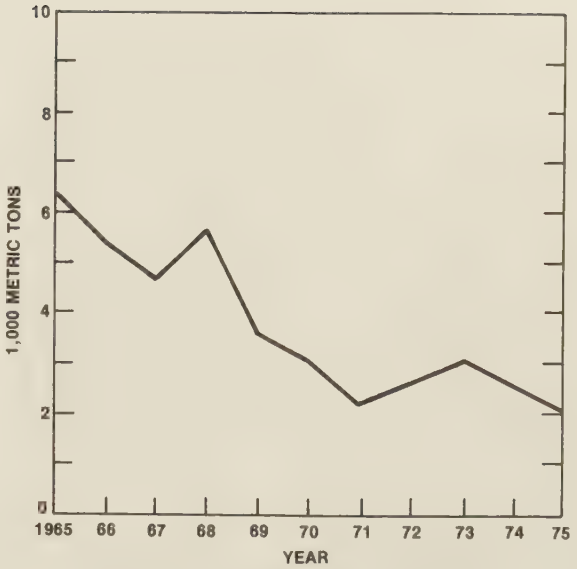
A. Introduction

Over 2,500 t of lobster, valued at $30 million, were exported from the Republic of South Africa and Namibia in 1975, according to official South African statistics (appendix F).[13/] This shows a decline of over 60 percent since 1965, when 6,300 t were exported (fig. 17). Most of the exports were frozen tails, but exports of live lobster to France are increasing.

B. Commodity

1. Live lobster

Exports of live lobster in 1975 were 291 t, valued at over $1.5 million (appendix F). Demand for live lobster is increasing, especially in France. The Cape Lobster Exporters Association (CLEA) is the marketing organization for live and whole frozen lobster, with six participating companies.[14/] A large part of the live lobster is shipped to Nice, France, where it is marketed by Cap Langouste, an affiliate of the CLEA, which holds a 50-percent interest in the French firm. The balance of the shares in Cap Langouste is held by Interpral of Paris, the sole French importer. The company's plant near Nice includes holding tanks for up to 20,000 live lobsters, and extensive cold storage plants and blast freezers. Customers buy the lobsters directly from Cap Langouste in Nice.



Year	Quantity	Value
	Metric tons1/	$1,000
1965	6,300	12,725
1966	5,300	10,485
1967	4,900	10,085
1968	5,700	13,034
1969	3,700	11,284
1970	3,000	10,394
1971	2,400	11,306
1972	2,700	11,388
1973	3,000	14,683
1974	2,6002/	22,480
1975	2,1002/	25,573

1/ Product weight.
2/ Export statistics by quantity are unavailable for 1974 and 1975. The above estimates were made by the International Fisheries Analysis Branch by subtracting domestic consumption from the annual production reported by FAO. This figure may be somewhat in error because data on cold holding stocks are not available. These statistics do not agree with the data in appendices F and G. The reason for this discrepancy is unknown.
Source: FAO. Yearbook of Fisheries Statistics, various years.

Figure 17.--Lobster exports of the Republic of South Africa and Namibia, 1965-75.

2. Frozen lobster

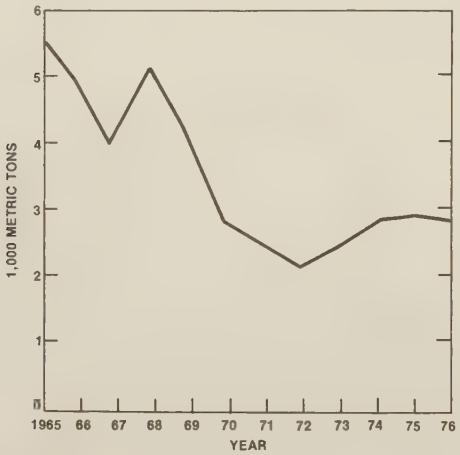
a. Whole

Exports of whole frozen lobster to Europe in 1975 were 152 t, valued at $558,000 (appendix F). Most of this lobster was exported to Cap Langouste in Nice, France, through CLEA and sold directly to customers. Whole-cooked frozen lobster is also exported to Japan, where the demand is increasing.

13/ U.S. import statistics place these figures considerably higher. Total 1975 lobster exports to the United States alone are listed as over 2,700 t, valued at nearly $29 million (appendix G). This discrepancy is unexplained.
14/ The six companies are Cape Reef Products, Elandia Visserye, Lighthouse Fisheries, Live Rock Lobster Corporation, Paternoster Visserye, and South African Lobster Exporters.

b. Tails

The United States is the largest single importer of South African lobster tails. In 1976, South African and Namibian tails were about 18 percent of all United States lobster tail imports. South Africa is now the second most important source of lobster tails for the United States (after Australia), although in the 1960's, South Africa was the largest supplier.[15] In 1965, the United States imported nearly 5,600 t (product weight) of frozen lobster tails, but shipments have since declined over 50 percent to only 2,714 t in 1976. Shipments since 1970 have been relatively stable at between 2,100 t and 2,800 t (fig. 18). Reduced exports to the United States were caused by declining lobster catches. Of all South African fishery exports to the United States in 1976, lobster was 65 percent of the total value (appendix G).



Year	Quantity
	--Metric tons--1/
1965	5554
1966	4910
1967	3905
1968	5086
1969	4183
1970	2702
1971	2541
1972	2113
1973	2432
1974	2702
1975	2848
1976	2714

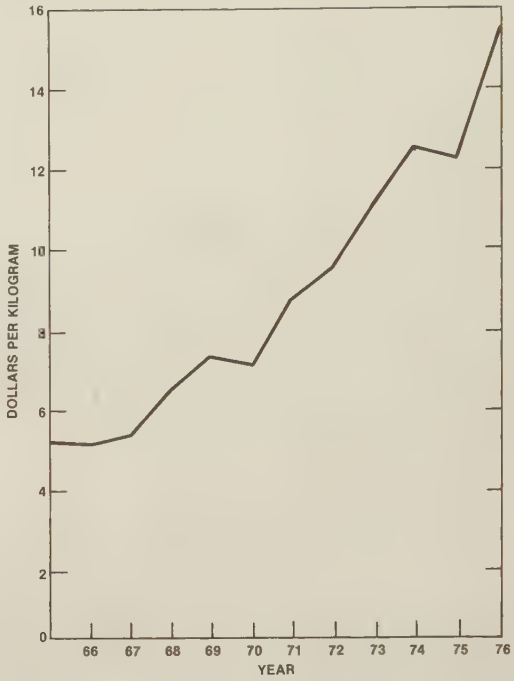
1/ Product weight

Source: U.S. Department of Commerce, Bureau of the Census.

Figure 18.--U.S. imports of lobster tails from the Republic of South Africa and Namibia, 1966-76.

15/ Other major exporters of lobster tails in 1976 were Australia (36 percent), Brazil (11 percent), New Zealand (9 percent), Nicaragua (4 percent), Honduras (3 percent), and India (3 percent).

Lobster tail prices in the United States have increased continuously, and have more than doubled since 1966 (fig. 19). According to the Industry and Consumer Services Division of the U.S. National Marine Fisheries Service (NMFS), the demand for cold-water tails[16] appears to be strong.[17]



Year	Price
	--U.S. dollars per kilogram--
1965	5.24
1966	5.20
1967	5.27
1968	6.57
1969	7.36
1970	7.12
1971	8.91
1972	9.59
1973	11.04
1974	12.54
1975	12.17
1976	15.41

Source: U.S. Department of Commerce. NMFS. Industry and Consumers Services Division.

Figure 19.--Average annual wholesale prices for 6-to 8-oz. (0.17 to 0.23 kg) lobster tails, 1965-76.

16/ The tails from lobsters caught in the southern latitudes off South Africa, Australia, and New Zealand are termed "cold-water tails." Tails of lobsters caught in tropical regions of Asia, Africa, and Latin America are termed "warm-water tails."

17/ U.S. Department of Commerce, NOAA, NMFS. Industry and Consumer Services Division. Market Review and Outlook: Shellfish, S-37, Dec. 1976, p. 8.

Monthly prices in the United States fluctuate considerably; in 1976, prices for most sizes were highest in December (appendix H). The smaller tails are the most expensive; in December, the wholesale price of a 4- to 6-oz (0.11 to 0.17 kg) tail was $16.98 per kilogram, compared with $15.15 per kilogram for a tail weighing 12 to 16 oz (0.34 to 0.45 kg) (appendix H).[18] There is also a price difference between cold- and warm-water tails; cold-water tails were from $1.50 to $3.15 more expensive per kilogram than warm-water tails in 1976.[19]

Some authorities maintain that the meat of cold-water tails is sweeter and less fibrous than that of warm-water tails; others say that most consumers can not distinguish between the two. When lobster shipments from Brazil and other tropical countries were begun, modern processing methods were not used and the quality of the warm-water tails was often inferior to that of shipments from the traditional cold-water suppliers. Although lobster exporters in many tropical countries have solved most of their quality control problems, the price differential persists.

Some U.S. importers have expressed a preference for West Coast tails. Restaurant buyers apparently believe that the shell of the West Coast lobster is darker and the meat sweeter than that of the South Coast lobster. They regard the West Coast lobster as "traditional" and are still uncertain about the South Coast species.[20] Shipments of West Coast tails are wrapped in plastic with red seals; the South Coast tails are identified by blue seals.

The marketing and export of frozen tails is handled by the South African Frozen Rock Lobster Packers (SAFROC), P.O. Box 2066, Capetown, 8000, Republic of South Africa. In the United States, all business regarding rock lobsters is managed by the South African Rock Lobster Service Corporation, 450 7th Avenue, New York, NY 10001. This organization represents the South African lobster industry in the United States and Canada, and serves as a broker for imports of lobster products. All of the lobster shipments are landed in New York; the Rock Lobster Service Corporation clears the shipments, handles customs formalities, and arranges cold storage in New York for importers.

18/ This is apparently because restaurants find that the smaller tails enable them to control the size of the portions; they may serve two small tails rather than one large tail. The small tails are also served with steak in the popular "surf-and-turf" combination.

19/ U.S. Department of Commerce. NOAA. NMFS. Industry and Consumer Services Division. Market Review and Outlook: Shellfish, S-37, Dec. 1976, p. 8.

20/ This may be due to the initial problem of discoloration of the tail membrane (page 8).

X. REGULATIONS

A. West Coast lobster fishery

The West Coast rock lobster industry of both the Republic of South Africa and Namibia is governed by regulations designed to protect the resource. Quotas are revised annually and assigned to individual processing companies. Regulations were promulgated in December 1976, requiring companies in the Republic to pay a tax of $0.046 per kilogram of tail mass. Companies in Namibia are required to pay $0.023 per kilogram. Lobster fishing is prohibited during a closed season from July 1 to October 31 in the Republic, and from July 1 to December 31 in Namibia, to protect the lobsters during the spawning season. Fishermen are also prohibited from catching lobsters in specially designated sanctuaries (fig. 20). During the fishing season, molting lobsters and egg-bearing females must be returned unharmed to the sea and the catch must be landed whole at specified ports. All vessels participating in the fishery must be licensed and registered. Table 3 summarizes West Coast lobster fishing regulations.

Figure 20.--West Coast rock lobster sanctuaries in the Republic of South Africa.

Table 3.--Lobster fishing regulations in the Republic of South Africa and Namibia

Regulation	West Coast		South Coast
	South Africa	Namibia	
Minimum carapace size	8.9 cm	6.35 cm	none
Closed season	July 1-Oct. 31	July 1-Dec. 31	July 1-Sept. 30
Landed form	whole only	whole only	tail only
Specified landing areas	yes	NA	NA
Quotas	yes	yes	no
Trap limit	no	no	yes
Sanctuaries	yes	NA	no

Source: South African Shipping News and Fishing Industry Review, various issues.

B. South Coast lobster fishery

The new South Coast lobster fishery is less well regulated. No minimum size limit, quotas, or sanctuaries have been established; the maximum sustainable yield of the resource is still unknown. The Government has, however, limited the number of traps carried by each vessel and established a closed season. The limitation on the number of traps was opposed by the industry which claimed that it forced them to operate inefficiently. In January 1976, the Government increased the number of traps per vessel (table 4).

Table 4.--Number of lobster traps permitted per South Coast vessel

Vessel length	Traps
Meters	
30 or less	400
31-36	500
37-42	750
43-48	1,000
48 or more	1,350

Source: South African Shipping News and Fishing Industry Review, Feb. 1976, p. 49.

In November 1975, the Government moved to exclude foreign vessels from the fishery. South African fishermen complained they were able to land less than half of the 1975 catch. All vessels must now be registered in South African ports. The Government allows the South Coast lobster to be processed at sea, but requires that after the tails are removed, the bodies must be pulverized and dumped after the vessel has left the lobster grounds. Table 3 summarizes the lobster fishing regulations.

XI. FOREIGN FISHING

The West Coast rock lobster grounds are within the 12-mile (22-km) fishing zones of both the Republic of South Africa and Namibia. Foreign fishermen have thus been unable to harvest this species.

The South Coast rock lobster grounds, however, are outside the 12-mile limit in international waters. After the discovery of the resource in 1974, fishing by Japanese, Australian, and French fishermen began; in 1975, foreign fishermen took over 50 percent of the catch. As a result, the South African Government enacted new regulations in November 1975 prohibiting foreign lobster fishing. The regulations specify that "no person on a boat... which is not registered in a harbor in the Republic (of South Africa)...and not licensed...shall catch rock lobster and South Coast rock lobster...outside the fishing zone of the continental shelf as referred to in section 7 of the Territorial Waters Act of 1963." This action effectively ended foreign lobster fishing. A South African company has acquired control of the single Australian vessel; the four French vessels were to have been purchased by their South African managers. Blue Continent Fishing purchased one of the Japanese vessels. The South African Government declared a 200-mile (370-km) fishing zone in 1977.

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XIII. ACKNOWLEDGEMENTS

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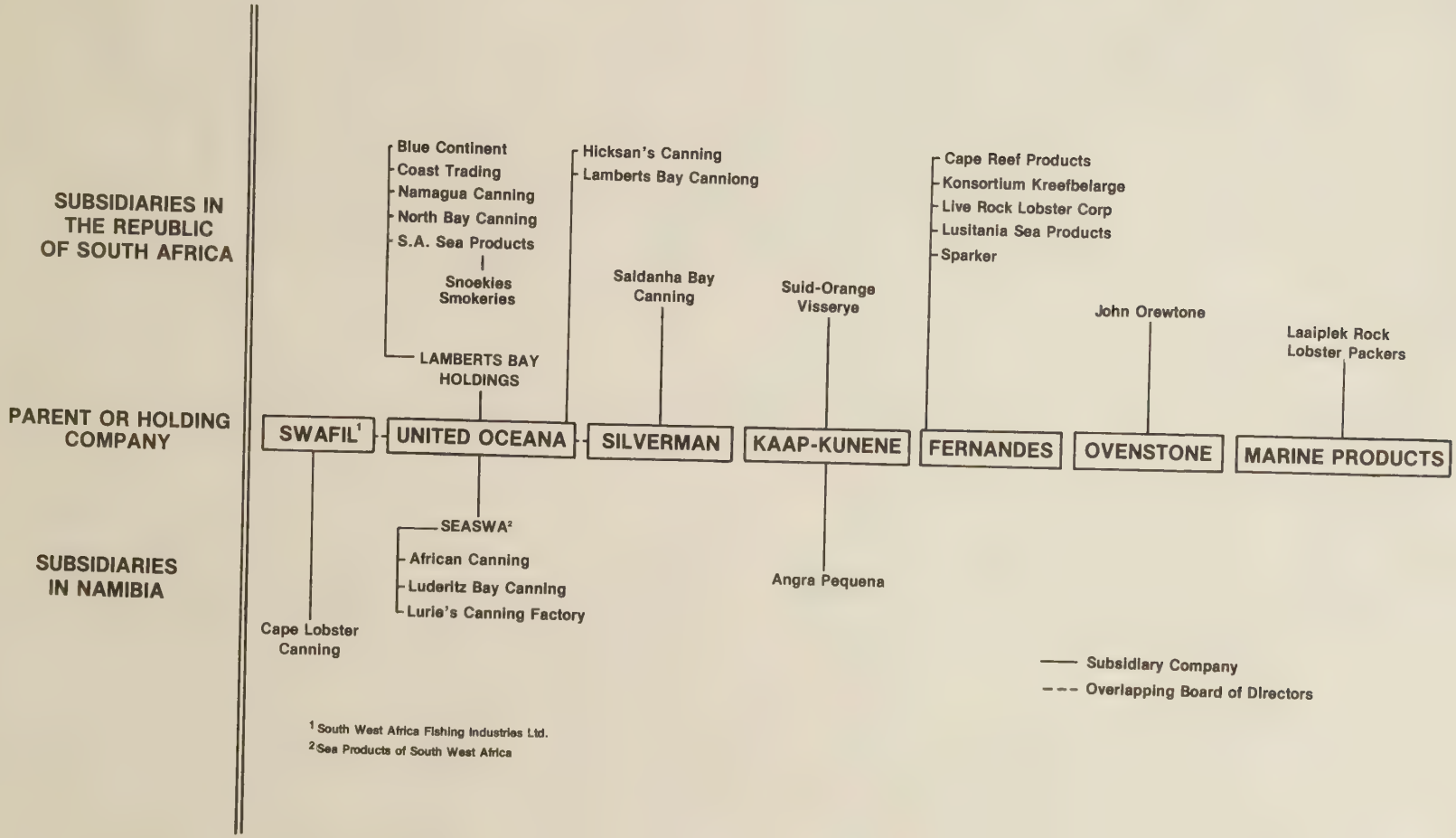
Appendix A.--Species information.

Common name	Scientific name	African Grounds	Habitat	Depth	Carapace Length: Av. Growth rate/year	Carapace Length: Max. Size	Carapace Length: Legal Catch size
				Meters	----Centimeters----		
West Coast rock lobster	Jasus lalandii	Walvis Bay (Namibia) to Capetown	rocks, crevices	to 38	0.5	17	8.9 (RSA) 6.3 (Namibia)
South Coast rock lobster	Palinurus gilchristi	Knysna to Port Alfred	rocks, crevices	110-150	0.1	12	none
Natal spiny lobster	Palinurus delagoae	Natal to Moma (Moz.)	open sandy areas	260-300	NA	NA	none
Transkei spiny lobster	Panulirus homarus	off Natal coast	surf zone of reefs	1-5	NA	NA	none
Tristan spiny lobster	Jasus tristani	Tristan da Cunha, Vema Seamount	rocky areas	NA	NA	NA	none
--	Panulirus longipes	Zululand and Natal	deep caves	NA	NA	NA	none
--	Panulirus ornatus	Natal to Red Sea	turbid water	1-8	NA	NA	none
--	Panulirus penicillatus	Zululand	caves	1-4	NA	NA	none
--	Panulirus versicolor	Durban harbor	NA	NA	NA	NA	none
--	Palinurus vulgaris	off Durban	NA	150-370	NA	NA	none

Appendix B.--Corporate structure of the South African and Namibian lobster fishery, 1975.



Appendix C.--South African companies processing the West Coast rock lobster in 1976.

Name	Location	Quota (tails) --Metric tons--	Ownership	Miscellaneous information
Bridger & Angelico	Capetown	56.4		
Cape Reef Products	Saldanha Bay	17.7	Fernandes	-has new live lobster holding facility at Jacobs Bay
Coast Trading Co.	Capetown	44.3	United Oceana	
Chapman's Peak Fisheries	Hout Bay	83.1	Independent	-has 10 vessels on West Coast grounds, 2 on South Coast grounds
Concentra Ltd.	Capetown	---		-produces lobster meal only
DeSeeda Seeprodukte		9.4		
Drommedaris Visserye	Elands Bay	62.1		
Elandia Visserye	Elands Bay	51.5		-member of Cape Lobster Exporters Association
Engelbrecht, Willem	Elands Bay	63.9		
Fish Drying Corp.	Stompneus Bay	68.9		
Good Hope Fisheries	Capetown	27.4		
Gourmet Fish Products		17.8		
Hickson's Canning Co.	Port Nolloth	26.5	United Oceana	
John Ovenstone Ltd.	Port Nolloth and Stompneus Bay	67.7	Ovenstone group	
KDB Holdings, Inc.	Hout Bay	32.9		
Konsortium Kreefbelange	Capetown	117.1	Fernandes	
Lamberts Bay Canning Co.	Lamberts Bay	236.6	United Oceana	
Lighthouse Fisheries		26.8		-member of Cape Lobster Exporters Association
Live Rock Lobster Corp.	Capetown (Melkbosstrand)	14.9	Fernandes	-member of Cape Lobster Exporters Association
Lusitania Sea Products	Capetown	44.3	Fernandes	
Laaiplek Rock Lobster Packers	Laaiplek	34.8	Marine Products group	
Namaqua Canning Co.	Hondeklip Bay	54.6	United Oceana	
North Bay Canning Co.	Doornbaai	153.9	United Oceana	
Paternoster Visserye	Paternoster	58.0		-member of Cape Lobster Exporters Association
Port Nolloth Visserye	Port Nolloth	15.3		

Appendix C. Continued

Name	Location	Quota (tails)	Ownership	Miscellaneous information
		-- Metric tons --		
Saldanha Bay Canning	Saldanha Bay	31.2	Silverman group	
Snoekies Smokeries	Hout Bay	29.1	Subsidiary of South African Sea Products (United Oceana group)	
South African Lobster Exporters		23.8		-member of Cape Lobster Exporters Association
South African Sea Products Ltd.	Hout Bay	155.1	United Oceana	
Southern Fish Packers		65.2		
Southern Sea Fishing Enterprises	Saldanha Bay	45.1		
Sparkor Ltd.	Paternoster	35.1	Fernandes	
Stephan Rock Lobster Packers	Velddrif	112.6		
Suid-Oranje Visserye	St. Helena Bay	13.6	Kaap-Kunene	

Source: Republic of South Africa. Government Gazette, November 28, 1975.

Appendix D.--South African companies involved in the South Coast rock lobster fishery, 1976.

Name	Location	Ownership	Vessels
Blue Continent Fishing	Paarden Eiland, Cape	United Oceana	-4 vessels; one (Harvest Dawn) operates in a joint venture with Sea Harvest Corp. -purchased Ocean Queen from Japanese owners
Chapman's Peak Fisheries	Hout Bay	Independent	-4 trawlers
Gaston Fernandes group		Fernandes group	-4 trawlers; 2 process at sea, 2 land the catch at Port Elizabeth for processing
Hout Bay Fishing Industries	Hout Bay	NA	-2 trawlers bought in Newfoundland
International Fishing Corp. (IFCOR)	Durban	FDC-supported	-1 vessel (Gillian Gaggins), ceased operations in 1977
Kuttelfish	Capetown	Independent	-largest fleet (8 vessels) on grounds -St. Jean Baptiste initiated fishery in March 1974; -during closed season vessels trawl for white fish; -recently took over Atlantic Trawling and bought 2 trawlers from Irvin & Johnson for South Coast fleet in 1976
Sentinal Fishing	Hout Bay	Independent	-in 1976 purchased one trawler (Erica) from Irvin and Johnson to begin fishing on the South Coast grounds

Appendix E.--Namibian companies in the West Coast rock lobster fishery, 1976.

Name	Location	Ownership	Miscellaneous information
African Canning Co.	Luderitz	Sea Products S.W.A. (Seaswa)	
Angra Pequena (Anquena)	Luderitz	Kaap-Kunene	-22 vessels -has meat extraction and meal production facilities
Atlantic Rock Lobster	Walvis Bay	independent	-although formed to process lobster, does not in fact process any
Cape Lobster Canning Co.	Luderitz	SWAFIL	
Luderitz Bay Canning Co.	Luderitz	Seaswa	
Lurie's Canning Factory	Luderitz	Seaswa	

Appendix F.--Lobster exports of the Republic of South Africa and Namibia, 1975.

Commodity	Destination	Quantity	Value
		Metric tons	$1,000
Live 1/	Europe	291	1,509
Frozen			
Whole 1/	Europe	152	558
	Japan	NA 2/	NA
Tails			
West Coast	United States	1,402	18,500
	Europe	280	3,650
South Coast	United States	428	5,655
	Europe	20	245
Total		2,573	30,117

1/ West Coast species only; most exports go to France.
2/ Small amounts of lobster are imported from, or transshipped through, the Republic of South Africa, but this is not reflected in Government statistics.
Source: U.S. Consulate General, Capetown, June 7, 1976.

Appendix G.--South African and Namibian lobster exports to the United States, compared with total fishery exports, 1974-76.

Commodity	1976 1/		1975 1/		1974 1/	
	Quantity 2/	Value	Quantity 2/	Value	Quantity 2/	Value
	Metric tons	$1,000	Metric tons	$1,000	Metric tons	$1,000
Frozen						
Tails	2,714	34,661	2,848	28,708	2,702	24,842
Other	31	108	6	8	5	19
Total lobster exports	2,745	34,769	2,854	28,716	2,707	24,861
Total fishery exports	18,683	53,894	14,970	38,107	25,744	43,446
Lobster exports as a percentage of total fishery exports	15	65	19	75	11	57

1/ 1975 and 1976 statistics are for the Republic and Namibia ("South West Africa") combined. 1974 statistics combine the Republic of South Africa and Namibia ("British West Africa").
2/ Product weight.
Source: U.S. Department of Commerce. Bureau of the Census.

Appendix H.--Wholesale prices of selected sizes of cold-water lobster tails, monthly, 1975-76.

Year	Tail size		Price											
	Kilograms	Ounces	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
			--Dollars per kilogram--											
1975	0.11 to 0.17	4 to 6	11.20	10.71	10.69	11.31	12.21	12.61	12.57	12.61	12.76	13.16	13.42	13.36
	0.17 to 0.23	6 to 8	11.24	10.80	10.78	11.55	12.15	12.48	12.39	12.39	12.54	12.94	13.40	13.45
	0.23 to 0.28	8 to 10	11.99	11.55	11.49	11.77	12.19	12.46	12.37	12.39	12.52	12.87	13.34	13.43
	0.28 to 0.34	10 to 12	12.03	11.51	12.12	12.01	12.52	12.46	12.34	12.39	12.52	12.79	13.14	13.29
	0.34 to 0.45	12 to 16	11.94	11.90	12.12	12.01	12.52	12.46	12.30	12.35	12.48	12.65	12.99	13.18
1976	0.11 to 0.17	4 to 6	13.25	13.31	13.73	14.86	15.83	16.40	16.49	16.47	16.36	16.58	16.93	16.98
	0.17 to 0.23	6 to 8	13.36	13.36	13.62	14.73	15.72	16.20	16.29	16.22	15.94	16.22	16.53	16.78
	0.23 to 0.28	8 to 10	13.38	13.38	13.62	14.59	15.54	15.92	16.20	16.09	15.87	15.96	16.11	16.53
	0.28 to 0.34	10 to 12	13.42	13.40	13.56	14.29	15.21	15.76	15.76	15.90	15.56	15.92	16.05	16.38
	0.34 to 0.45	12 to 16	13.31	13.27	13.54	14.29	15.25	15.54	15.54	15.61	14.84	14.93	15.10	15.15

Source: U.S. Department of Commerce. NMFS. Industry and Consumer Services Division.

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